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BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Application Number: 10/702,368
Filing Date: November 06, 2003
Appellant(s): DIVERGILIO ET AL.

Thomas G. Eschweiler
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed April 2, 2008 appealing from the Office action mailed August 23, 2007.

(1) Real Party in Interest

A statement identifying by name the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

(3) Status of Claims

The statement of the status of claims contained in the brief is correct.

(4) Status of Amendments After Final

The appellant's statement of the status of amendments after final rejection contained in the brief is correct.

(5) Summary of Claimed Subject Matter

The summary of claimed subject matter contained in the brief is correct.

(6) Grounds of Rejection to be Reviewed on Appeal

The appellant's statement of the grounds of rejection to be reviewed on appeal is correct.

(7) Claims Appendix

The copy of the appealed claims contained in the Appendix to the brief is correct.

(8) Evidence Relied Upon

WO 01/63981 A1	WEILER	8-2001
US 5846883 A	MOSLEHI	12-1998

(9) Grounds of Rejection

The following grounds of rejection are applicable to the appealed claims:

Claims 13-25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Weiler; Manfred et al. (WO 200163981 A)[1] in view of Moslehi; Mehrdad M. (US 5846883 A). Weiler teaches an ion shower system (Figure 1, Abstract), comprising: a plasma (Abstract) source (1-6; Figure 1, Abstract) operable to generate source gas ions within a chamber (7; Figure 1, Abstract), wherein the plasma (Abstract) source (1-6; Figure 1, Abstract) further comprises: a plurality of conductor segments (3; Figure 1, 2, 4; Abstract); an antenna drive circuit (8,2,9; Figure 1; Abstract) coupled to the plurality of conductor segments (3; Figure 1, 2, 4; Abstract), and operable to provide power to the conductor segments (3; Figure 1, 2, 4; Abstract); and a source gas inlet (6; Figure 1; Abstract), wherein the source gas inlet (6; Figure 1; Abstract) is operable to provide a source gas to the chamber (7; Figure 1, Abstract), and wherein the conductor segments (3; Figure 1, 2, 4; Abstract), antenna drive circuit (8,2,9; Figure 1; Abstract) cooperatively provide energy to charged particles in the chamber (7; Figure 1, Abstract), thereby energizing the charged particles and generating a plasma (Abstract) comprising source gas ions and electrons within the chamber (7; Figure 1, Abstract) to ionizing collisions between the energized charged particles and the source gas; an extraction assembly (5; Figure 1; Abstract) associated with the chamber (7; Figure 1, Abstract) and operable to extract source gas ions therefrom.

Weiler further teaches:

i. The ion shower of claim 13, wherein first and last conductor segments (3; Figure 1, 2, 4; Abstract) of the plurality of conductor segments (3; Figure 1, 2, 4; Abstract) form an

input, and wherein the antenna drive circuit (8,2,9; Figure 1; Abstract) is coupled to the input, as claimed by claim 15

ii. The ion shower (Figure 1, Abstract) of claim 13, wherein the antenna drive circuit (8,2,9; Figure 1; Abstract) comprises an oscillator circuit (8,2,9; Figure 1; Abstract), as claimed by claim 18

iii. The ion shower (Figure 1, Abstract) of claim 18, wherein the oscillator circuit (8,2,9; Figure 1; Abstract) comprises a push-pull oscillator circuit (8,2,9; Figure 1; Abstract), as claimed by claim 19

iv. The ion shower (Figure 1, Abstract) of claim 13, wherein the plurality of conductor segments (3; Figure 1, 2, 4; Abstract) are arranged within the chamber (7; Figure 1, Abstract) in an azimuthally symmetric fashion, wherein a non-uniform capacitive electrostatic field component along each conductor segment is repeated in an azimuthally symmetric fashion – claim 20

v. The ion shower (Figure 1, Abstract) of claim 13, wherein the extraction assembly (5; Figure 1; Abstract) is associated with a top portion of the chamber (7; Figure 1, Abstract), and is operable to extract ions vertically from the top portion thereof, as claimed by claim 21

vi. The ion shower (Figure 1, Abstract) of claim 13, wherein the chamber (7; Figure 1, Abstract) further comprises a bottom portion and side portions, and wherein the side portions comprise a plurality of multi-cusp magnet devices (4; Figure 1, Abstract) operable to produce multi-cusp magnetic fields thereat to facilitate an azimuthal

[1] The Examiner's requested translation of WO 200163981 A from the translations branch is conveyed herewith. The

uniformity of plasma (Abstract) within the chamber (7; Figure 1, Abstract), as claimed by claim 23

vii. The ion shower (Figure 1, Abstract) of claim 23, wherein the multi-cusp magnet devices (4; Figure 1, Abstract) comprise electromagnets (4; Figure 1, Abstract)[1] operable to provide a variation in multi-cusp magnetic field strength at differing positions along the side portions, as claimed by claim 24

viii. The ion shower (Figure 1, Abstract) of claim 24, wherein the electromagnets are independently controllable, thereby facilitating a tuning of the multi-cusp magnetic fields, as claimed by claim 25

Weiler does not teach:

i. a plurality of capacitors, wherein the conductor segments (3; Figure 1, 2, 4; Abstract) are serially connected through the plurality of capacitors, wherein the series arrangement of conductor segments (3; Figure 1, 2, 4; Abstract) and capacitors reside within the chamber (7; Figure 1, Abstract) – claim 13

ii. The ion shower of claim 13, further comprising a workpiece support structure associated with the chamber (7; Figure 1, Abstract), and operable to secure the workpiece for implantation thereof of source gas ions from the extraction assembly (5; Figure 1; Abstract), as claimed by claim 14

iii. The ion shower of claim 13, wherein the conductor segments (3; Figure 1, 2, 4; Abstract) have an inductive reactance associated therewith, and wherein the capacitors have a capacitive reactance associated therewith, and wherein one of the conductors and one of

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[1] Examiner's final rejection is based on the translation from USPat. 6,936,144 (citing WO 200163981 A as priority)

the capacitors form an antenna segment, wherein the inductive reactance and capacitive reactance of the antenna segment are equal at the predetermined frequency, as claimed by claim 16. Applicant's claim requirements of "the conductor segments have an inductive reactance associated therewith" is a recitation of inherency in of the prior art elements and Applicant's claimed subject matter. When the structure recited in the reference is substantially identical to that of the claims, claimed properties or functions are presumed to be inherent (In re Best, 562 F.2d 1252, 1255, 195 USPQ 430, 433 (CCPA 1977); MPEP 2112.01). Further, Applicant's claim requirement of "wherein the inductive reactance and capacitive reactance of the antenna segment are equal at the predetermined frequency" is a claim requirement of intended use in the pending apparatus claims. Further, it has been held that claim language that simply specifies an intended use or field of use for the invention generally will not limit the scope of a claim (Walter , 618 F.2d at 769, 205 USPQ at 409; MPEP 2106). Additionally, in apparatus claims, intended use must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim (In re Casey,152 USPQ 235 (CCPA 1967); In re Otto , 136 USPQ 458, 459 (CCPA 1963); MPEP2111.02).

iv. The ion shower of claim 13, wherein the plurality of conductor segments (3; Figure 1, 2, 4; Abstract) and plurality of capacitors form a resonant circuit (8,2,9; Figure 1; Abstract) at the predetermined frequency, as claimed by claim 17. Applicant's claim requirement of

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as an aid in interpreting identically numbered elements.

"form a resonant circuit at the predetermined frequency" is a claim requirement of intended use in the pending apparatus claims. Further, it has been held that claim language that simply specifies an intended use or field of use for the invention generally will not limit the scope of a claim (Walter , 618 F.2d at 769, 205 USPQ at 409; MPEP 2106). Additionally, in apparatus claims, intended use must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim (In re Casey,152 USPQ 235 (CCPA 1967); In re Otto , 136 USPQ 458, 459 (CCPA 1963); MPEP2111.02).

v. The ion shower (Figure 1, Abstract) of claim 21, further comprising a workpiece support structure associated with the top portion of the chamber (7; Figure 1, Abstract), and operable to secure the workpiece having an implantation surface orientated facing downward toward the extraction assembly (5; Figure 1; Abstract) for implantation thereof, as claimed by claim 22

Moslehi teaches a plasma processing apparatus including a plurality of capacitors (356,358,360,362,364; Figure 9; column 15,16) and conductor segments (356,358,360,362,364; Figure 9; column 15,16), wherein the conductor segments ("antenna zones"; throughout) are serially connected through the plurality of capacitors (356,358,360,362,364; Figure 9; column 15,16). Moslehi further teaches a wafer support (Figure 11; not numbered).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to add Moslehi's serially located capacitors between Weiler's plurality of conductor segments (3; Figure 1, 2, 4; Abstract) and to add Moslehi's wafer support (Figure 11; not numbered).

Motivation to add Moslehi's serially located capacitors between Weiler's plurality of conductor segments (3; Figure 1, 2, 4; Abstract) and to add Moslehi's wafer support (Figure 11; not numbered) is for reducing induced RF voltages as taught by Moslehi (column 2; lines 20-30), and for supporting a desired article, respectively.

(10) Response to Argument

Applicant states:

"

In the response to the Non-final Office Action of March 12, 2007, an argument was presented that the proposed combination of Weiler and Moslehi was improper due to a lack of the requisite motivation to make the suggested combination. More particularly, the Non-final Office Action conceded that Weiler did not teach a plurality of conductor segments serially connected together through a plurality of capacitors, however, since Moslehi did provide such a feature, a combination of Weiler and Moslehi taught the claim feature at issue and rendered claim 13 obvious there over.

"

In response to applicant's argument that there is no suggestion to combine the references, the examiner recognizes that obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988)and *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). In this case, the Examiner believes that his stated motivation is motivation found in the

references themselves (Moslehi:column 2; lines 20-30) and is thus "in the knowledge generally available to one of ordinary skill in the art".

Applicant further states:

"

In traversing the rejection, the argument proffered by the applicant in the response of June 6, 2007 was that since Weiler taught a particular combination of conductor segments in which each conductor segment was connected to its own separate high frequency generator, *a modification of Weiler in view of Moslehi would not be proper because such a modification would render Weiler unsatisfactory for its intended purpose.* The Final Office Action of August 23, 2007 rejected the submitted argument by stating that the above argument constituted an attack on the Weiler reference individually when the rejection was based on a the combination of references. (O.A., 8/23/07, p. 9, paragraph 10). It is respectfully submitted that the above rationale for maintaining the rejection constitutes either a misunderstanding of the law or a misapplication of the principle as applied to the present facts in this application.

"

In response, the Examiner maintains his position that Applicant is applying a piece-meal analysis of the cited prior art. Indeed, it is the fact that Applicant's narrowly perceived "intended purpose" of the Weiler reference is solely within the confines of Weiler itself and not the Examiner's rejection of the pending claims of *Weiler in view of Moslehi*. Furthermore, the correctly scoped "intended purpose" of *both* Weiler and Moslehi is, among numerous coexisting objectives such as efficient plasma generation and control (Weiler: Translation page 1, lines 1-10; Moslehi: column 18; lines 42-60), the fact that each of Weiler and Moslehi use identical

functional circuit elements (compare Weiler's electrical elements of Figure 1, 2, 4 for plasma generation and Moslehi's electrical elements of Figure 9 for plasma generation) for plasma generation and control is sufficient evidence for establishing that the "intended purpose" of Weiler is the same "intended purpose" for Moslehi and that Moslehi's teaching of reducing induced RF voltages (column 2; lines 20-30) is also an intended purpose of Weiler and is thus the Examiner's cited grounds for combining the references. Because the circuit configuration and function of Weiler and Moslehi are so closely matched, the will share in the same art-recognized attributes and short comings.

In support of the Examiner's above analysis, Applicant thus states:

"

While it is true that nonobviousness cannot be shown by attacking references individually, that is not what is being done in the present argument. Rather, an analysis has been made as to whether one of ordinary skill in the art would have been motivated to modify Weiler in view of Moslehi *when evaluating both references in their entirety.*

"

In response, the Examiner agrees and reiterates his consideration of both Weiler and Moslehi as a whole as guided by MPEP 2141.

Applicant states:

"

In this particular case, however, based on the teachings of Weiler when properly evaluated as a whole, a modification thereof in view of Moslehi would render Weiler unsatisfactory for its

intended purpose, and the MPEP explicitly states that in such instances no motivation exists for such modifications. MPEP § 2143.01 (V)

"

In response, the Examiner disagrees and only needs to cite the Moslehi Apparatus, which is satisfactory for both Moslehi's and Weiler's intended purpose (see Examiner's above positions regarding the parity of objectives between Moslehi and Weiler), and does meet the claimed limitation of "…a plurality of capacitors serially connected through the conductor segments". In fact, because Moslehi specifically teaches the claimed a plurality of capacitors (356,358,360,362,364; Figure 9; column 15,16) and conductor segments (356,358,360,362,364; Figure 9; column 15,16), wherein the conductor segments ("antenna zones"; throughout) *are serially connected through the plurality of capacitors* (356,358,360,362,364; Figure 9; column 15,16) one of ordinary skill in the art at the time the invention was made, having knowledge of Weiler's apparatus, would find the teachings of Moslehi beneficial for the Examiner's stated motivation. Again, the Examiner emphasizes the parity of *processing objectives* between Moslehi and Weiler as well as the identical circuit elements used for meeting the *processing objectives*. See the Examiner's analysis above.

Applicant cites Weiler's disclosure in support of Applicant's position:

"

Thus the intended purpose of Weiler is to have flexibility to generate different kinds of plasmas by being able to individually address or drive each electrode segment.

"

And…

“

…the intended purpose of Weiler (which was to separately drive each segment with its own power source to generate different plasmas and thus control and adjust beam characteristics…

“

In response, the Examiner points out that Applicant’s stated purpose for Weiler is also Moslehi’s stated purpose (Moslehi column 24; lines 30-38) albeit accomplished by an art acceptable obvious change in circuit element orientation – parallel vs. series connection. Here, Moslehi’s conductor segments (356,358,360,362,364; Figure 9; column 15,16) each have the same flexibility to generate different kinds of plasmas by being able to individually address or drive each electrode segment:

“

Moreover, these multi-zone power supplies may use external RF matching networks (not shown in FIG. 22) placed between the RF power supplies and the ICP antenna zones *for improved load matching, improved RF power coupling, and improved plasma process repeatability.*

“ (Moslehi column 24; lines 30-38)

Applicant states:

“

Regarding claim 13, an argument was provided in the response to the Non-final Office Action of March 12, 2007 that even if the combination of Weiler and Moslehi was deemed proper (which applicant does not concede) the combination of Weiler and Moslehi fail to render claim 13 obvious because *neither reference teach a series arrangement of conductor segments and capacitors that resides within the chamber as claimed.*

“

In response, the Examiner specifically cited that Weiler indeed teaches that the plurality of conductor segments (3; Figure 1, 2, 4; Abstract) are arranged *within* the chamber (7; Figure 1, Abstract). However, the Examiner does go on record that Weiler does not teach *a plurality of capacitors*, wherein the conductor segments (3; Figure 1, 2, 4; Abstract) are serially connected through the plurality of capacitors, wherein the series arrangement of conductor segments (3; Figure 1, 2, 4; Abstract) *and capacitors* reside within the chamber (7; Figure 1, Abstract) – claim 13. However, it is well established that the rearrangement of parts is considered obvious to those of ordinary skill (In re Japikse , 181 F.2d 1019, 86 USPQ 70 (CCPA 1950); In re Kuhle , 526 F.2d 553, 188 USPQ 7 (CCPA 1975); Ex parte Chicago Rawhide Manufacturing Co. , 223 USPQ 351, 353 (Bd. Pat. App. & Inter. 1984).; MPEP 2144.04). Further, the Examiner notes that Applicant's own capacitors 306 Figure 13 are encased within antenna system 126 far away from any ionized gases (as is the cited prior art) found inside Applicant's chamber 102 housing Applicant's antenna system 126. As a result, although technically one can consider Applicant's capacitors 306 Figure 13 as being "within" the processing chamber, they are not exposed to plasma from the processing chamber. This is also well known by the prior art as shown because such an exposure would lead to particulates from the capacitor materials. In the same manner, Moslehi's ICP source (Figure 10; 311; Figure 11) may be designed in a fashion more invasive (for greater plasma density) to the "chamber" permitting that his capacitors also be "within", but shielded from the plasma – see Moslehi's Figure 11.

Applicant further states with respect to Weiler..

“

While the excitation electrodes 3 reside inside the chamber, they electrically connect to their respective power source 8 via a conductor that extends outside of the chamber via a feed through 9. Consequently, the electrical connection of an excitation electrode to any other components (the matching network 2 and RF source 8) happens external to the chamber (Lc., on the opposite side of the mounting element 1 than the electrode 3). Therefore one of ordinary skill in the art, upon evaluating Weiler as a whole, would couple a capacitor to a respective excitation electrode 3 at the end of the external conductor that extends into the chamber via the feed through 9, just as the matching network 2 and RF source are connected to the electrode outside of the chamber. This characterization of Weiler is further supported by the teaching of Weiler, wherein the magnetic field coils 4 are also located external to the chamber 7 via the contoured mounting element 1, as illustrated in Fig. 1

"

In response, the Examiner disagrees. Applicant's preference for what one of ordinary skill in the art would do when coupling a capacitor to a respective excitation electrode 3 is not an analysis of Weiler *as a whole*. The coupling of Weiler's capacitors to a respective excitation electrode 3 would function in the same manner if the coupling were made inside of outside Weiler's chamber. This is because each of the two configurations are *circuit equivalents* as would be known to one of ordinary skill in the art.

With respect to Weiler, Applicant states:

"

In the Office Action, it states that Weiler teach conductor segments that are azimuthally symmetric, citing to element 3 of Figs. 1,2 and 4, respectively. In looking at Figs. 2a-2j, it is

noted that only Figs. 2e-2j illustrates multiple conductor segments. Of those figures, none of them show the conductor segments arranged azimuthally. For example, in Fig. 2j, four conductor segments are arranged in a square, but such segments are not arranged azimuthally as claimed. In Figs. 4a-4n magnetic coil assemblies are illustrated, not conductor segments connected to capacitors. (See, e.g., Col. 6, lines 55-57). Therefore neither reference teach this arrangement, either alone or in combination. Consequently, claim 20 is non-obvious over the cited art. Accordingly, for at least this additional reason, reversal of the rejection is respectfully requested.

"

In response, Weiler's conductor segments (3; Figure 1, 2, 4; Abstract) are all, with the exception of 2h,i, are *all azimuthally symmetric* i.e. form a 360° path. As a result, the Examiner notes that *azimuthal symmetry* is not relegated to circular geometries. Such symmetry is present when a point finds a mirrored point across the azimuth (axis into the page).

Applicant further states:

"

Contrary to the assertion within the Final Office Action (see O.A., 8/23/07, p. 4, paragraph vi), Weiler does not teach a plurality of multi-cusp magnets as claimed. Weiler does teach a magnetic field coil arrangement, as illustrated in Fig. 1, however, such coil arrangement does not constitute multi-cusp magnets and do not produce multi-cusp fields as claimed.

"

In response, the Examiner believes that physical law mandates that a *single* coil current produces an electro-magnet that possesses a "multi-cusp". One cusp is the north pole, while the other cusp is the south pole via elementary "right-hand-rule". Further, that Weiler's electromagnets (4;

Figure 1, Abstract) describe numerous electromagnets with each having two cusps is provided by translation:

"

....an arrangement of various magnetic field *coils* to generate a transverse magnetic field (4)...

" (page 9, line 14-15)

Such an arrangement by Weiler would thus have numerous electromagnets interacting exhibiting numerous magnetic cusps by superposition principle.

(11) Related Proceeding(s) Appendix

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

/Rudy Zervigon/

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